



## Research-method notes

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## Research Methodology (Unit-I and 2)

### Meaning Of Research:

Research in simple terms refers to search for knowledge. It is a scientific and systematic search for information on a particular topic or issue. It is also known as the art of scientific investigation. Several social scientists have defined research in different ways.

### Objectives Of Research

The main aim of research is to find out the truth which is hidden and has not yet been discovered. Although every research study has its own specific objectives, the research objectives may be broadly grouped as follows:

1. To gain familiarity with new insights into a phenomenon (i.e., formulative research studies);
2. To accurately portray the characteristics of a particular individual, group, or a situation (i.e., descriptive research studies);
3. To analyse the frequency with which something occurs (i.e., diagnostic research studies); and
4. To examine the hypothesis of a causal relationship between two variables (i.e., hypothesis-testing research studies).

### Research Methods Versus Methodology:

Research methods include all those techniques/methods that are adopted for conducting research. Thus, research techniques or methods are the methods that the researchers adopt for conducting the research studies.

On the other hand, research methodology is the way in which research problems are solved systematically. It is a science of studying how research is conducted scientifically.

### Research Approaches:

There are two main approaches to research:

1. **Quantitative approach** :The quantitative approach involves the collection of quantitative data. This approach further includes experimental, inferential, and simulation approaches to research.
2. **Qualitative approach**: The qualitative approach uses the method of subjective assessment of opinions, behaviour and attitudes.

## **Types Of Research:**

### **1. Descriptive Versus Analytical:**

Descriptive research consists of surveys and fact-finding enquiries of different types. The main objective of descriptive research is describing the state of affairs as it prevails at the time of study.

In the Analytical research, the researcher has to use the already available facts or information, and analyse them to make a critical evaluation of the subject.

### **2. Applied Versus Fundamental:**

Research can also be applied or fundamental in nature. An attempt to find a solution to an immediate problem encountered by a firm, an industry, a business organisation, or the society is known as applied research. The objective of applied research is to find a solution to some pressing practical problem.

Fundamental research mainly concerns generalizations and formulation of a theory.

### **3. Quantitative Versus Qualitative:**

Quantitative research relates to aspects that can be quantified or can be expressed in terms of quantity. It involves the measurement of quantity or amount. Various available statistical and econometric methods are adopted for analysis in such research.

Qualitative research is concerned with qualitative phenomena, or more specifically, the aspects related to or involving quality or kind.

### **4. Conceptual Versus Empirical:**

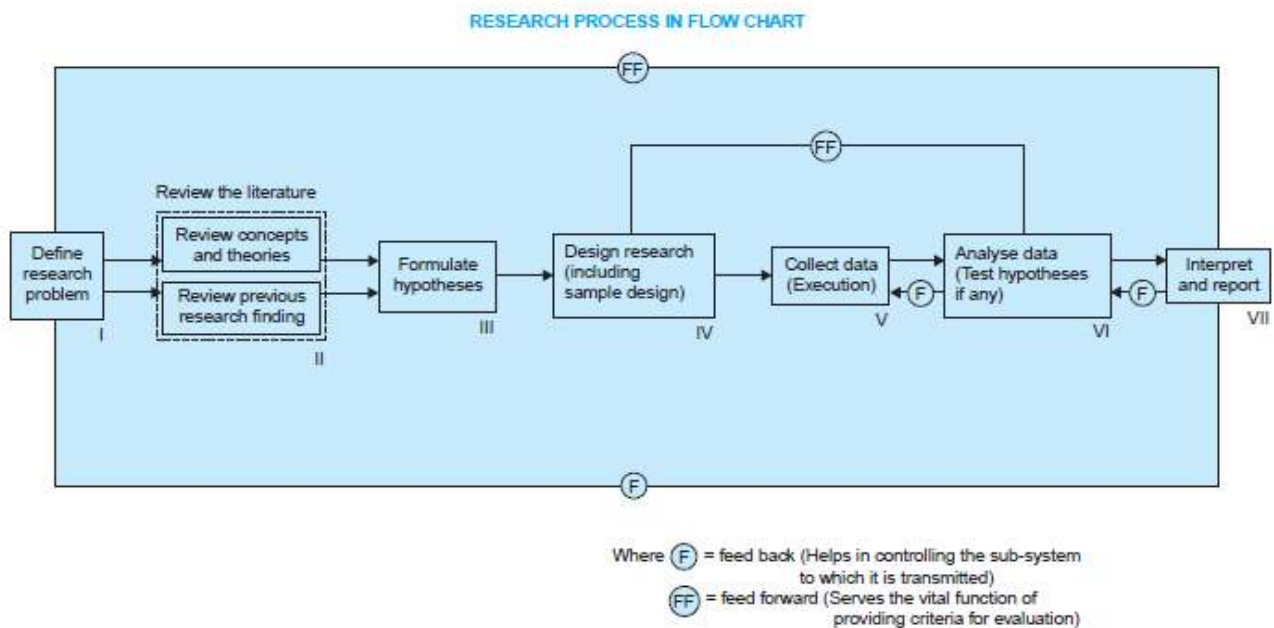
The research related to some abstract idea or theory is known as Conceptual Research. Generally, philosophers and thinkers use it for developing new concepts or for reinterpreting the existing ones.

Empirical Research, on the other hand, exclusively relies on the observation or experience with hardly any regard for theory and system. Such research is data based, which often comes up with conclusions that can be verified through experiments or observation.

## **Research Process:**

Research process consists of a series of steps or actions required for effectively conducting research. The following are the steps that provide useful procedural guidelines regarding the conduct of research:

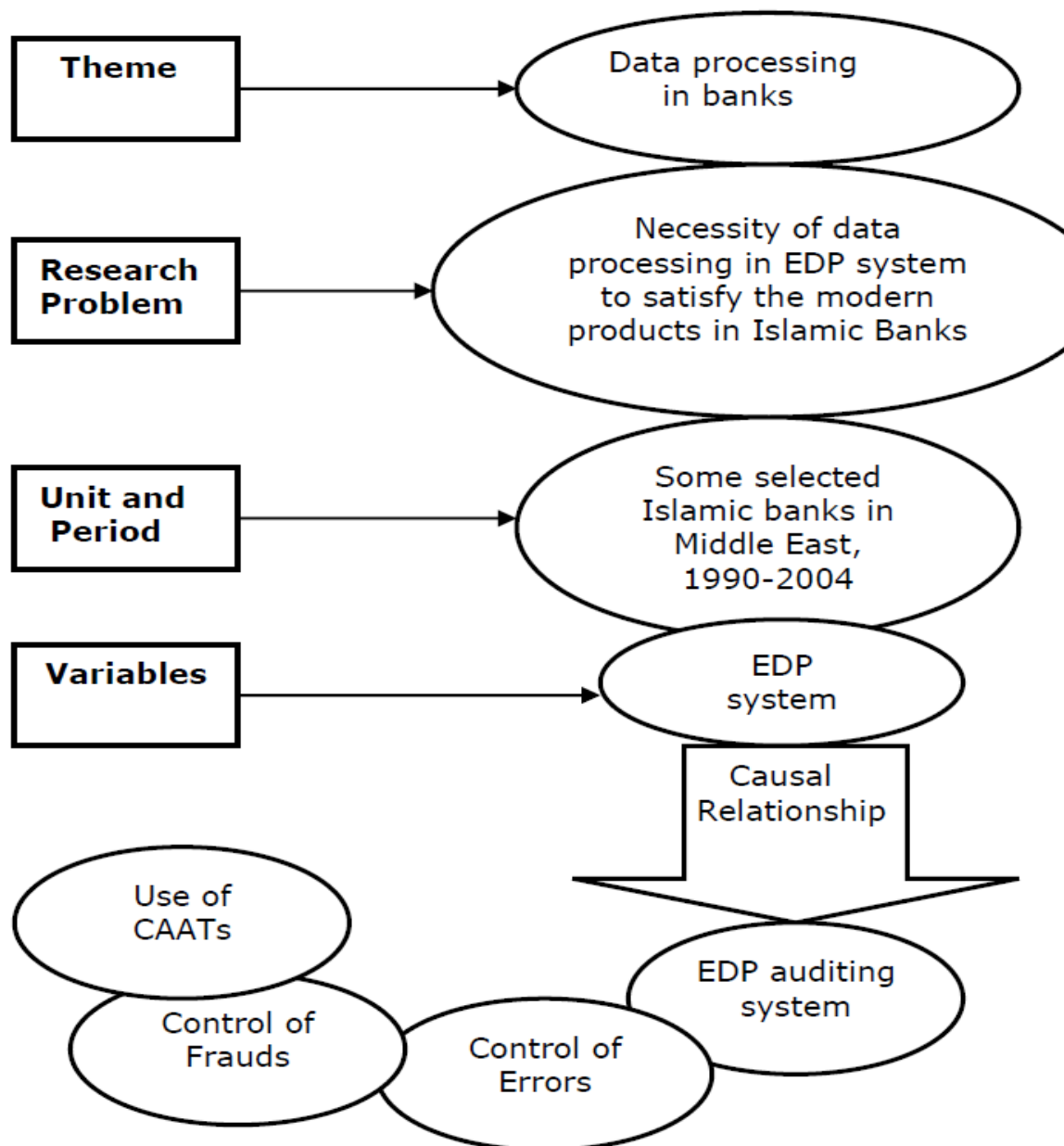
- (1) Formulating the research problem;
- (2) Extensive literature survey;
- (3) Developing hypothesis;
- (4) Preparing the research design;
- (5) Determining sample design;
- (6) Collecting data;
- (7) Execution of the project;
- (8) Analysis of data;
- (9) Hypothesis testing;
- (10) Generalization and interpretation, and
- (11) Preparation of the report or presentation of the results.



## Research Problem

A research problem, in general, refers to some difficulty which a researcher experiences in the context of either a theoretical or practical situation and wants to obtain a solution for the same.

“A research problem refers to an unanswered question that a researcher might encounter in the context of either a theoretical or practical situation, which he/she would like to answer or find a solution to.”



## **Formulating the research problem**

There are two types of research problems, viz., those which relate to states of nature and those which relate to relationships between variables. At the very outset the researcher must single out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into. Essentially two steps are involved in formulating the research problem, viz., understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view.

The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help from a guide who is usually an experienced man and has several research problems in mind.

## **Research Design:**

“A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.” In fact, the research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data.

As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data.

The designing decisions happen to be in respect of:

- (i) What is the study about?
- (ii) Why is the study being made?
- (iii) Where will the study be carried out?
- (iv) What type of data is required?
- (v) Where can the required data be found?
- (vi) What periods of time will the study include?
- (vii) What will be the sample design?
- (viii) What techniques of data collection will be used?
- (ix) How will the data be analysed?
- (x) In what style will the report be prepared?

## **Features of good Research Design:**

The important features of Research Design may be outlined as follows:

- (i) the means of obtaining information;
- (ii) the availability and skills of the researcher and his staff, if any;
- (iii) the objective of the problem to be studied;
- (iv) the nature of the problem to be studied; and
- (v) the availability of time and money for the research work.

## **DIFFERENT RESEARCH DESIGNS**

### **(1) Research design in case of exploratory research studies:**

Exploratory research studies are also termed as formulative research studies. The main purpose of such studies is that of formulating a problem for more precise investigation or of developing the working hypotheses from an operational point of view.

Generally, the following three methods in the context of research design for such studies are talked about: (a) the survey of concerning literature; (b) the experience survey and (c) the analysis of 'insight-stimulating' examples.

**(2) Research design in case of descriptive and diagnostic research studies:** Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group, whereas diagnostic research studies determine the frequency with which something occurs or its association with something else.

The design in such studies must be rigid and not flexible and must focus attention on the following:

- (a) Formulating the objective of the study (what the study is about and why is it being made?)
- (b) Designing the methods of data collection (what techniques of gathering data will be adopted?)
- (c) Selecting the sample (how much material will be needed?)
- (d) Collecting the data (where can the required data be found and with what time period should the data be related?)
- (e) Processing and analysing the data.
- (f) Reporting the findings.

The difference between research designs in respect of the above two types of research studies can be conveniently summarised in tabular form as under:

<i>Research Design</i>	<i>Type of study</i>	
	<i>Exploratory or Formulative</i>	<i>Descriptive/Diagnostic</i>
Overall design	Flexible design (design must provide opportunity for considering different aspects of the problem)	Rigid design (design must make enough provision for protection against bias and must maximise reliability)
(i) Sampling design	Non-probability sampling design (purposive or judgement sampling)	Probability sampling design (random sampling)
(ii) Statistical design	No pre-planned design for analysis	Pre-planned design for analysis
(iii) Observational design	Unstructured instruments for collection of data	Structured or well thought out instruments for collection of data
(iv) Operational design	No fixed decisions about the operational procedures	Advanced decisions about operational procedures.

### 3. Research design in case of hypothesis-testing research studies:

Hypothesis-testing research studies (generally known as experimental studies) are those where the researcher tests the hypotheses of causal relationships between variables. Such studies require procedures that will not only reduce bias and increase reliability, but will permit drawing inferences about causality

#### Research Hypothesis:

When a prediction or a hypothesized relationship is tested by adopting scientific methods, it is known as research hypothesis. The research hypothesis is a predictive statement which relates to a dependent variable and an independent variable.

For instance, the following statements may be considered:

- i. "Students who take tuitions perform better than the others who do not receive tuitions" or,
- ii. "The female students perform as well as the male students".

#### Characteristics of Hypothesis:

A hypothesis should have the following characteristic features:-

- i. A hypothesis must be precise and clear.
- ii. A hypothesis must be capable of being put to test.
- iii. A hypothesis must state relationship between two variables, in the case of relational hypotheses.



- iv. A hypothesis must be specific and limited in scope.
- v. A hypothesis must be stated in the simplest language, so as to make it understood by all concerned.
- vi. A hypothesis must be consistent and derived from the most known facts.

## MEASUREMENT IN RESEARCH

In our daily life we are said to measure when we use some yardstick to determine weight, height, or some other feature of a physical object. We also measure when we judge how well we like a song, a painting or the personalities of our friends.

Measurement is a relatively complex and demanding task, specially so when it concerns qualitative or abstract phenomena. By measurement we mean the process of assigning numbers to objects or observations, the level of measurement being a function of the rules under which the numbers are assigned.

### MEASUREMENT SCALES:

The most widely used classification of measurement scales are: (a) nominal scale; (b) ordinal scale; (c) interval scale; and (d) ratio scale

**(a) Nominal scale:** Nominal scale is simply a system of assigning number symbols to events in order to label them. The usual example of this is the assignment of numbers of basketball players in order to identify them. Nominal scale is the least powerful level of measurement. It indicates no order or distance relationship and has no arithmetic origin.

**(b) Ordinal scale:** The lowest level of the ordered scale that is commonly used is the ordinal scale. The ordinal scale places events in order, but there is no attempt to make the intervals of the scale equal in terms of some rule. Rank orders represent ordinal scales and are frequently used in research relating to qualitative phenomena. A student's rank in his graduation class involves the use of an ordinal scale.

**(c) Interval scale:** In the case of interval scale, the intervals are adjusted in terms of some rule that has been established as a basis for making the units equal. The units are equal only in so far as one accepts the assumptions on which the rule is based.

**(d) Ratio scale:** Ratio scales have an absolute or true zero of measurement. The term 'absolute zero' is not as precise as it was once believed to be. We can conceive of an absolute zero of length and similarly we can conceive of an absolute zero of time. For example, the zero point on a centimetre scale indicates the complete absence of length or height. But an absolute zero of temperature is theoretically unobtainable and it remains a concept existing only in the scientist's mind.

### Sources of Error in Measurement

Measurement should be precise and unambiguous in an ideal research study. This objective, however, is often not met with in entirety. As such the researcher must be aware about the sources of error in measurement. The following are the possible sources of error in measurement.

**(a) Respondent:** At times the respondent may be reluctant to express strong negative feelings or it is just possible that he may have very little knowledge but may not admit his ignorance. All this reluctance is likely to result in an interview of 'guesses.' Transient factors like fatigue, boredom, anxiety, etc. may limit the ability of the respondent to respond accurately and fully.

**(b) Situation:** Situational factors may also come in the way of correct measurement. Any condition which places a strain on interview can have serious effects on the interviewer-respondent rapport.

For instance, if someone else is present, he can distort responses by joining in or merely by being present. If the respondent feels that anonymity is not assured, he may be reluctant to express certain feelings.

**(c) Measurer:** The interviewer can distort responses by rewording or reordering questions. His behaviour, style and looks may encourage or discourage certain replies from respondents. Careless mechanical processing may distort the findings. Errors may also creep in because of incorrect coding, faulty tabulation and/or statistical calculations, particularly in the data-analysis stage.

**(d) Instrument:** Error may arise because of the defective measuring instrument. The use of complex

words, beyond the comprehension of the respondent, ambiguous meanings, poor printing, inadequate space for replies, response choice omissions, etc. are a few things that make the measuring instrument defective and may result in measurement errors. Another type of instrument deficiency is the poor sampling of the universe of items of concern.

Researcher must know that correct measurement depends on successfully meeting all of the problems listed above

## Sampling (Unit-3)

Sampling is a process used in statistical analysis in which a predetermined number of observations are taken from a larger population.

### CENSUS AND SAMPLE SURVEY

All items in any field of inquiry constitute a 'Universe' or 'Population.' A complete enumeration of all items in the 'population' is known as a census inquiry. It can be presumed that in such an inquiry, when all items are covered, no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the

slightest element of bias in such an inquiry will get larger and larger as the number of observation increases. Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Therefore, when the field of inquiry is large, this method becomes difficult to adopt because of the resources involved. At times, this method is practically beyond the reach of ordinary researchers. Perhaps, government is the only institution which can get the complete enumeration carried out. Even the government adopts this in very rare cases such as population census conducted once in a decade.

### **Sample Design**

A sample design is a definite plan for obtaining a sample from a given population.

A sample design helps to decide the number of items to be included in the sample, i.e., the size of the sample. The sample design should be determined prior to data collection. There are different kinds of sample designs which a researcher can choose.

### **IMPLICATIONS OF A SAMPLE DESIGN**

A sample design is a definite plan for obtaining a sample from a given population. It refers to The technique or the procedure the researcher would adopt in selecting items for the sample.

### **STEPS IN SAMPLE DESIGN**

#### **1) Type Of Universe:**

The first step involved in developing sample design is to clearly define the number of cases, technically known as the universe. A universe may be finite or infinite. In a finite universe the number of items is certain, whereas in the case of an infinite universe the number of items is infinite (i.e., there is no idea about the total number of items). For example, while the population of a city or the number of workers in a factory comprise finite universes, the number of stars in the sky, or throwing of a dice represent infinite universe.

#### **2) Sampling Unit:**

A sampling unit may be a geographical area like a state, district, village, etc., or a social unit like a family, religious community, school, etc., or it may also be an individual. At times, the researcher would have to choose one or more of such units for his/her study.

#### **3) Source List:**

Source list is also known as the 'sampling frame', from which the sample is to be selected. The source list consists of names of all the items of a universe. The source list must be reliable, comprehensive, correct, and appropriate.

#### **4) Size Of Sample:**

Size of the sample refers to the number of items to be chosen from the universe to form a sample. For a researcher, this constitutes a major problem. The size of sample must be optimum. An optimum sample may be defined as the one that satisfies the requirements of representativeness, flexibility, efficiency, and reliability.

### **CHARACTERISTICS OF A GOOD SAMPLE DESIGN**

From what has been stated above, we can list down the characteristics of a good sample design as under:

- (a) Sample design must result in a truly representative sample.
- (b) Sample design must be such which results in a small sampling error.
- (c) Sample design must be viable in the context of funds available for the research study.
- (d) Sample design must be such so that systematic bias can be controlled in a better way.
- (e) Sample should be such that the results of the sample study can be applied, in general, for the universe with a reasonable level of confidence.

### **Types Of Sample Designs**

**1. Non-probability sampling :** It is a sampling technique in which the researcher selects samples based on the subjective judgment of the researcher rather than random selection.

In non-probability sampling, not all members of the population have a chance of participating in the study. Non-probability sampling is carried out by methods of observation and is widely used in [qualitative research](#).

### **Probability Sampling:**

Probability sampling is also known as 'choice sampling' or 'random sampling'. Under this sampling design, every item of the universe has an equal chance of being included in the sample. In a way, it is a lottery method under which individual units are selected from the whole group, not deliberately, but by using some mechanical process. Therefore, only chance would determine whether an item or the other would be included in the sample or not. The results obtained from probability or random sampling would be assured in terms of probability.

**Systematic sampling:** In some instances, the most practical way of sampling is to select every  $i$ th item on a list. Sampling of this type is known as systematic sampling. An element of randomness is introduced into this kind of sampling by using random numbers to pick up the unit with which to start. For instance, if a 4 per cent sample is desired, the first item would be selected randomly from the first twenty-five and thereafter every 25th item would automatically be included in the sample.

## Unit-4

### Processing and Analysis of Data

The data, after collection, has to be processed and analysed in accordance with the outline laid down for the purpose at the time of developing the research plan. This is essential for a scientific study and for ensuring that we have all relevant data for making contemplated comparisons and analysis.

Technically speaking, processing implies editing, coding, classification and tabulation of collected data so that they are amenable to analysis. The term analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data-groups.

### PROCESSING OPERATIONS

**1.Editing:** Editing of data is a process of examining the collected raw data (specially in surveys) to detect errors and omissions and to correct these when possible. As a matter of fact, editing involves a careful scrutiny of the completed questionnaires and/or schedules. Editing is done to assure that the data are accurate, consistent with other facts gathered, uniformly entered, as completed as possible and have been well arranged to facilitate coding and tabulation.

**2. Coding:** Coding refers to the process of assigning numerals or other symbols to answers so that responses can be put into a limited number of categories or classes. Such classes should be appropriate to the research problem under consideration.

**3. Classification:** Most research studies result in a large volume of raw data which must be reduced into homogeneous groups if we are to get meaningful relationships. This fact necessitates classification of data which happens to be the process of arranging data in groups or classes on the basis of common characteristics. Data having a common characteristic are placed in one class and in this way the entire data get divided into a number of groups or classes.

**4. Tabulation:** When a mass of data has been assembled, it becomes necessary for the researcher to arrange the same in some kind of concise and logical order. This procedure is referred to as tabulation. Thus, tabulation is the process of summarising raw data and displaying the same in compact form (i.e., in the form of statistical tables) for further analysis. In a broader sense, tabulation is an orderly arrangement of data in columns and rows.

### PROBLEMS IN PROCESSING

**(a) The problem concerning “Don’t know” (or DK) responses:** While processing the data, the researcher often comes across some responses that are difficult to handle. One category of such responses may be ‘Don’t Know Response’ or simply DK

response. When the DK response group is small, it is of little significance. But when it is relatively big, it becomes a matter of major concern in which case the question arises:

### **Is the question which elicited DK response useless?**

The answer depends on two points viz., the respondent actually may not know the answer or the researcher may fail in obtaining the appropriate information.

### **How DK responses are to be dealt with by researchers?**

The best way is to design better type of questions. Good interviewers with respondents will result in minimising DK responses. But what about the DK responses that have already taken place?

One way to tackle this issue is to estimate the allocation of DK answers from other data in the questionnaire. The other way is to keep DK responses as a separate category in tabulation where we can consider it as a separate reply category if DK responses happen to be legitimate, otherwise we should let the reader make his own decision.

**b) Use or percentages:** Percentages are often used in data presentation for they simplify numbers, reducing all of them to a 0 to 100 range. Through the use of percentages, the data are reduced in the standard form with base equal to 100 which fact facilitates relative comparisons.

## **ELEMENTS/TYPES OF ANALYSIS**

Analysis, particularly in case of survey or experimental data, involves estimating the values of unknown parameters of the population and testing of hypotheses for drawing inferences. Analysis may, therefore, be categorised as descriptive analysis and inferential analysis (Inferential analysis is often known as statistical analysis).

“*Descriptive analysis* is largely the study of distributions of one variable. This study provides us with profiles of companies, work groups, persons and other subjects on any of a multiple of characteristics such as size, composition, efficiency, preferences, etc.

In modern times, with the availability of computer facilities, there has been a rapid development of *multivariate analysis* which may be defined as “all statistical methods which simultaneously analyse more than two variables on a sample of observations”. Usually the following analyses are involved when we make a reference of multivariate analysis:

### **(a) Multiple regression analysis:**

This analysis is adopted when the researcher has one dependent variable which is presumed to be a function of two or more independent variables. The objective of this

analysis is to make a prediction about the dependent variable based on its covariance with all the concerned independent variables.

For example, you could use multiple regression to understand whether exam performance can be predicted based on revision time, test anxiety, lecture attendance and gender.

- (b) **Multiple discriminant analysis:** This analysis is appropriate when the researcher has a single dependent variable that cannot be measured, but can be classified into two or more groups on the basis of some attribute. The object of this analysis happens to be to predict an entity's possibility of belonging to a particular group based on several predictor variables.

For example, a research team has been organized to study the outcomes of buildings on fire when residents are involved. The purpose of the study is to predict what elements can ensure the safe release of residents even before the fire security team arrives. The Hypothesis is that many variables may be good predictors of safe evacuation versus injury to during evacuation of residents. These variables may be: number of residents, access to fire station, number of floors in a building etc.

- (c) **Multivariate analysis of variance (or multi-ANOVA):** This analysis is an extension of two way ANOVA, wherein the ratio of among group variance to within group variance is worked out on a set of variables.

One-way ANOVA between groups: used when you want to test **two groups** to see if there's a difference between them.

- (d) **Canonical analysis:** This analysis can be used in case of both measurable and non-measurable variables for the purpose of simultaneously predicting a set of dependent variables from their joint covariance with a set of independent variables. variables related to exercise and health.

On one hand, you have variables associated with exercise, observations such as the climbing rate on a stair stepper, how fast you can run a certain distance, the amount of weight lifted on bench press, the number of push-ups per minute, etc.

On the other hand, you have variables that attempt to measure overall health, such as blood pressure, cholesterol levels, glucose levels, body mass index, etc. Two types of variables are measured and the relationships between the exercise variables and the health variables are of interest.

## **Unit-5**

### **Interpretation and Report Writing**

After collecting and analysing the data, the researcher has to accomplish the task of drawing inferences (a conclusion reached) followed by report writing.

#### **MEANING OF INTERPRETATION**

Interpretation refers to the task of drawing inferences from the collected facts after an analytical and/or experimental study.

Thus, interpretation is the device through which the factors that seem to explain what has been observed by researcher in the course of the study can be better understood and it also provides a theoretical conception which can serve as a guide for further researches.

#### **TECHNIQUE OF INTERPRETATION**

The task of interpretation is not an easy job, rather it requires a great skill.

Interpretation is an art that one learns through practice and experience. The researcher may, at times, seek the guidance from experts for accomplishing the task of interpretation.

The technique of interpretation often involves the following steps:

- (i) Researcher must give reasonable explanations of the relations which he has found and he must interpret the lines of relationship in terms of the underlying processes.
- (ii) It is advisable, before embarking upon final interpretation, to consult someone having insight into the study and who is frank and honest and will not hesitate to point out omissions and errors in logical argumentation. Such a consultation will result in correct interpretation and, thus, will enhance the utility of research results.
- (iv) Researcher must accomplish the task of interpretation only after considering all relevant factors affecting the problem to avoid false generalization.

#### **PRECAUTIONS IN INTERPRETATION**

One should always remember that even if the data are properly collected and analysed, wrong interpretation would lead to inaccurate conclusions. It is, therefore, absolutely essential that the task of interpretation be accomplished (skilled) with patience in an impartial (unbiased) manner and also in correct perspective (view).

#### **SIGNIFICANCE OF REPORT WRITING**

Research report is considered a major component of the research study for the research task remains incomplete till the report has been presented and/or written. As a matter of fact even the most brilliant hypothesis, highly well designed and conducted research study, and the most striking generalizations and findings are of little value unless they are effectively communicated to others.

#### **DIFFERENT STEPS IN WRITING REPORT**



1. ***Logical analysis of the subject matter:*** It is the first step which is primarily concerned with the development of a subject. There are two ways in which to develop a subject (a) logically and (b) chronologically. The **logical** development is made on the basis of mental connections and associations between the one thing and another by means of analysis. **Chronological** development is based on a connection or sequence in time or occurrence.
2. ***Preparation of the final outline:*** It is the next step in writing the research report “Outlines are the framework upon which long written works are constructed. They are an aid to the logical organisation of the material and a reminder of the points to be stressed in the report.”
3. ***Preparation of the rough draft:*** This follows the logical analysis of the subject and the preparation of the final outline. Such a step is of utmost importance for the researcher now sits to write down what he has done in the context of his research study. He will write down the procedure adopted by him in collecting the material for his study along with various limitations faced by him, the technique of analysis adopted by him, the broad findings and generalizations and the various suggestions he wants to offer regarding the problem concerned.
4. ***Rewriting and polishing of the rough draft:*** This step happens to be most difficult part of all formal writing. Usually this step requires more time than the writing of the rough draft. The careful revision makes the difference between a mediocre and a good piece of writing. While rewriting and polishing, one should check the report for weaknesses in logical development or presentation. The researcher should also “see whether or not the material, as it is presented, has unity and cohesion; does the report stand upright and firm and exhibit a definite pattern, like a marble arch? Or does it resemble an old wall of mouldering cement and loose brick.”
5. ***Preparation of the final bibliography:*** Next in order comes the task of the preparation of the final bibliography. The bibliography, which is generally appended to the research report, is a list of books. It should contain all those works which the researcher has consulted. The bibliography should be arranged alphabetically and may be divided into two parts; the first part may contain the names of books and pamphlets, and the second part may contain the names of magazine and newspaper articles.

## **LAYOUT OF THE RESEARCH REPORT**

Anybody, who is reading the research report, must necessarily be conveyed enough about the study so that he can place it in its general scientific context, judge the adequacy of its methods and thus form an opinion of how seriously the findings are to be taken.

### **(A) Preliminary Pages**

In its preliminary pages the report should carry a *title and date*, followed by acknowledgements in the form of 'Preface' or 'Foreword'. Then there should be a *table of contents* followed by *list of tables and illustrations* so that the decision-maker or anybody interested in reading the report can easily locate the required information in the report.

### **(B) Main Text**

The main text provides the complete outline of the research report along with all details. Title of the research study is repeated at the top of the first page of the main text and then follows the other details on pages numbered consecutively, beginning with the second page. Each main section of the report should begin on a new page. The main text of the report should have the following sections:

(i) Introduction; (ii) Statement of findings and recommendations; (iii) The results; (iv) The implications drawn from the results; and (v) The summary.

### **(C) End Matter**

At the end of the report, appendices should be enlisted in respect of all technical data such as questionnaires, sample information, mathematical derivations and the like ones. Bibliography of sources consulted should also be given. Index (an alphabetical listing of names, places and topics along with the numbers of the pages in a book or report on which they are mentioned or discussed) should invariably be given at the end of the report.

## **TYPES OF REPORTS**

Research reports vary greatly in length and type. In each individual case, both the length and the form are largely dictated by the problems at hand. For instance, business firms prefer reports in the letter form, just one or two pages in length. Banks, insurance organisations and financial institutions are generally fond of the short balance-sheet type of tabulation for their annual reports to their customers and shareholders.

### **(A) Technical Report**

In the technical report the main emphasis is on (i) the methods employed, (ii) assumptions made in the course of the study, (iii) the detailed presentation of the findings including their limitations and supporting data.

A general outline of a technical report can be as follows:

1. *Summary of results*: A brief review of the main findings just in two or three pages.
2. *Nature of the study*: Description of the general objectives of study, formulation of the problem in operational terms, the working hypothesis, the type of analysis and data required, etc.

3. *Methods employed*: Specific methods used in the study and their limitations. For instance, in sampling studies we should give details of sample design viz., sample size, sample selection, etc.
4. *Data*: Discussion of data collected, their sources, characteristics and limitations. If secondary data are used, their suitability to the problem at hand be fully assessed. In case of a survey, the manner in which data were collected should be fully described.
5. *Analysis of data and presentation of findings*: The analysis of data and presentation of the findings of the study with supporting data in the form of tables and charts be fully narrated. This, in fact, happens to be the main body of the report usually extending over several chapters.
6. *Conclusions*: A detailed summary of the findings and the policy implications drawn from the results be explained.
7. *Bibliography*: Bibliography of various sources consulted be prepared and attached.
8. *Technical appendices*: Appendices be given for all technical matters relating to questionnaire, mathematical derivations, elaboration on particular technique of analysis and the like ones.
9. *Index*: Index must be prepared and be given invariably in the report at the end.

## **B) Popular Report**

The popular report is one which gives emphasis on simplicity and attractiveness. The simplification should be sought through clear writing, minimization of technical, particularly mathematical, details and liberal use of charts and diagrams.

We give below a general outline of a popular report.

1. *The findings and their implications*: Emphasis in the report is given on the findings of most practical interest and on the implications of these findings.
2. *Recommendations for action*: Recommendations for action on the basis of the findings of the study is made in this section of the report.
3. *Objective of the study*: A general review of how the problem arise is presented along with the specific objectives of the project under study.
4. *Methods employed*: A brief and non-technical description of the methods and techniques used, including a short review of the data on which the study is based, is given in this part of the report.
5. *Results*: This section constitutes the main body of the report wherein the results of the study are presented in clear and non-technical terms with liberal use of all sorts of illustrations such as charts, diagrams and the like ones.

## MECHANICS OF WRITING A RESEARCH REPORT

There are very definite and set rules which should be followed in the actual preparation of the research report or paper. Once the techniques are finally decided, they should be scrupulously adhered to, and no deviation permitted. The criteria of format should be decided as soon as the materials for the research paper have been assembled. The following points deserve mention so far as the mechanics of writing a report are concerned:

1. *Size and physical design:* The manuscript should be written on unruled paper 8 1/2" × 11" in size. If it is to be written by hand, then black or blue-black ink should be used. A margin of at least one and one-half inches should be allowed at the left hand and of at least half an inch at the right hand of the paper. There should also be one-inch margins, top and bottom. The paper should be neat and legible. If the manuscript is to be typed, then all typing should be double-spaced on one side of the page only except for the insertion of the long quotations.
2. *Procedure:* Various steps in writing the report should be strictly adhered (All such steps have already been explained earlier in this chapter).
3. *Layout:* Keeping in view the objective and nature of the problem, the layout of the report should be thought of and decided and accordingly adopted (The layout of the research report and various types of reports have been described in this chapter earlier which should be taken as a guide for report-writing in case of a particular problem).
4. *Treatment of quotations:* Quotations should be placed in quotation marks and double spaced, forming an immediate part of the text. But if a quotation is of a considerable length (more than four or five type written lines) then it should be single-spaced and indented at least half an inch to the right of the normal text margin.
5. *Documentation style:* Regarding documentation, the first footnote reference to any given work should be complete in its documentation, giving all the essential facts about the edition used. Such documentary footnotes follow a general sequence.

## PRECAUTIONS FOR WRITING RESEARCH REPORTS

Research report is a channel of communicating the research findings to the readers of the report. A good research report is one which does this task efficiently and effectively. As such it must be prepared keeping the following precautions in view:

1. While determining the length of the report (since research reports vary greatly in length), one should keep in view the fact that it should be long enough to cover the subject but short enough to maintain interest. In fact, report-writing should not be a means to learning more and more about less and less.
2. A research report should not, if this can be avoided, be dull; it should be such as to sustain reader's interest.

3. Abstract terminology and technical jargon should be avoided in a research report. The report should be able to convey the matter as simply as possible. This, in other words, means that report should be written in an objective style in simple language, avoiding expressions such as “it seems,” “there may be” and the like.
4. Readers are often interested in acquiring a quick knowledge of the main findings and as such the report must provide a ready availability of the findings. For this purpose, charts, addition to the summary of important findings.
5. The layout of the report should be well thought out and must be appropriate and in accordance with the objective of the research problem.
6. The reports should be free from grammatical mistakes and must be prepared strictly in accordance with the techniques of composition of report-writing such as the use of quotations, footnotes, documentation, proper punctuation and use of abbreviations in footnotes and the like.
7. The report must present the logical analysis of the subject matter. It must reflect a structure wherein the different pieces of analysis relating to the research problem fit well.
8. A research report should show originality and should necessarily be an attempt to solvesome intellectual problem. It must contribute to the solution of a problem and must add to the store of knowledge.